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(54) Elastic, springy element and springy support provided with such elastic, springy elements

(57) Elastic, springy element containing a cylindrical foam body (1) provided with inward directed cavities (3) in its wall, characterized in that the outside of the body (1) is narrowing/widening from one end to the other. A springy support contains a core which consists of a plate (7) which is provided with openings (8) through which foam bodies (1) extend which are constricted by the plate (7) in the openings (8).

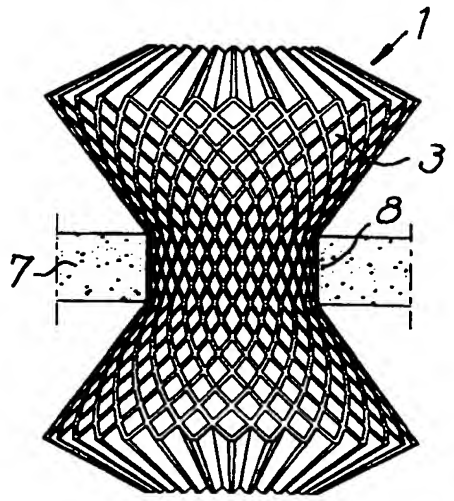

Fig.6

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Description

The present invention concerns an elastic, springy element of the type containing a cylindrical foam body provided with inward directed cavities, which can be used for example to replace steel springs as assembly parts for armchairs, mattresses, pillows and such.

The foam can be both synthetic foam, such as for example polyurethane foam, or natural foam, such as natural latex.

Such springy elements offer excellent spring qualities and an optimal comfort and they can be easily processed.

They are usually made by perforating a strip of foam, by subsequently cutting it in pieces and by finally fixing together the ends thereof, for example by means of gluing, thus forming a hollow body which is cylindrical in the known springy elements.

Such an elastic springy element is known from Belgian patent No. 1.007.171.

By seeking an optimum ratio between the material thicknesses and the diameter of the springy element, it was tried to obtain a balanced spring, which resulted in a springy element which was perfectly cylindrical on the inside as well as on the outside.

Consequently, when such a springy element is loaded, the pressure is evenly distributed over the entire top surface or pressure area and the underlying cavities.

Because the material is compressed more on the inside when the springy element is formed on the basis of a flat strip, and thus has a larger density on the inside than on the outside, the resistance of the springy element increases from the outside towards the inside.

Such springy elements are suitable as springs with a relatively large resistance, such as for a mattress, where said resistance can even be increased by applying a steel spring in the central cavity of the foam body.

However, such springy elements are not suitable to be used as particularly soft springs as are applied for example in pillows.

For there are no foams which are sufficiently soft to make a qualitatively good, soft, springy element. With foams, for example polyurethane foams, the softness is usually inversely proportionate to the specific gravity. Foams having a low specific gravity, and thus which are very soft, do not have the required force and mass to develop entirely into an even spring, as the required internal tensions lack and/or they form springy elements which fatigue very quickly and which loose their initial heights and shapes after a short while.

The invention aims a springy element which does not have these and other disadvantages and which consequently has a maximum softness an elasticity which are also maintained in time.

This aim is reached according to the invention by means of an elastic, springy element containing a cylindrical foam body provided with inward directed cavities in its wall, whereby the outside of the body narrows/widens from one end to the other.

Such a springy element is soft thanks to the shape of the body which can be made from a foam with a relatively large density.

Preferably, the body is round and the diameter in the middle amounts to 85% or less of the diameter at the far ends of the body.

This narrowing/widening shape may be the result of internal tension differences in the body during the construction thereof, for example because the body is composed of layers with a different hardness, is provided with cavities in its wall which are bigger towards the far ends of the body than in the middle, has a wall thickness which is particularly large in relation to the perimeter, or is made of a piece of foam whose edges, which are fixed together during the formation of the body, are bent in a hollow manner.

Preferably however, this narrowing/widening shape is the result of external means, for example a ring or cylinder which surrounds the centre of the body and constricts it, or a plate provided with an opening through which the body extends with its centre part in the opening. The ring or cylinder as well as the plate can be made of material which is either or not springy, such as foam.

This narrowing/widening shape may also be the result of internal means, namely one or several cores provided in the tubular body.

The invention also concerns a springy support containing springy elements according to any of the preceding embodiments which are anchored in relation to one another.

According to a special embodiment, the springy support is a pillow containing a springy core which is formed of a foam plate provided with openings through which foam bodies extend which are constricted by the foam plate in the openings.

In order to better explain the characteristics of the invention, the following preferred embodiments of a springy element and of a pillow provided with such elements are described as an example only without being limitative in any way, with reference to the accompanying drawings, in which:

figure 1 shows a front view of a springy element according to the invention;
figure 2 shows a section according to line II-II in figure 1;
figure 3 shows a front view analogous to that in figure 1 of half a springy element, but in relation to another embodiment of the invention;
figure 4 shows a view in perspective of a piece or block from which can be made a springy element according to yet another embodiment;
figure 5 shows a front view analogous to that in figures 1 and 3, but with reference to yet another embodiment according to the invention;
figure 6 shows a front view analogous to that of figure 5, but with reference to a variant;

figure 7 shows a section of a springy supporting element according to the invention.

figure 8 shows a front view in which a springy element according to the invention has been partially cut out, but with reference to yet another embodiment.

The springy element according to figures 1 to 3, 5, 6 and 9 contains a cylindrical body 1 of foam, for example polyurethane foam, or foam of natural or synthetic latex, provided with a central opening 2 which extends axially between the two far ends, which is provided with inwardly directed cavities 3 in its wall, and whose outer side narrows/widens from one end to the other.

This implies that the outer perimeter of the body 1 decreases from both ends to the middle halfway the far ends.

If the body is round as represented in the figures 1 to 6, the diameter will be bigger on the far ends than in the middle, and the outside of this body will be practically bi-conical. The diameter in the middle preferably amounts to 85% or less of the diameter on the far ends.

The surfaces on the far ends are not flat either, but slightly conical on the outside, which of course promotes the springy capacity of the body 1.

The central opening 2, however, is practically cylindrical, except in the embodiment according to figure 8.

The cavities 3, which are preferably situated in a slanted symmetry, have for example a diamond-shaped section which decreases from the outside towards the inside to practically zero on the inside of the body 1.

When a vertical load is exerted on the standing springy element, i.e. with the axis of its body directed vertically as is represented in figures 1, 3, 5, 6 to 8, the pressure will be no longer entirely distributed over the entire body 1, but it will be mainly absorbed by the top part thereof which, on the outside, will partly bend over the part of the body situated underneath it.

As a result, the springy element will be softer than if the body 1 had the same perimeter over its entire height as on the far ends.

Consequently, it is possible to make the body 1 of foam with a relatively large density, which allows to obtain a qualitatively better springy element and yet remain the suppleness of a springy element with a body of foam with a smaller density and thus less durability and recovery capacity.

The narrowing/widening shape of the outside of the body 1 can be obtained in several manners, and the construction of said body 1 is partly determined by these construction methods which will be described hereafter.

All these methods have in common that the body 1 is made on the basis of a flat piece or block of foam which is provided with short cuts over its entire surface which extend through the thickness of the piece or block and which are preferably arranged according to a slanting pattern.

This piece or block is then folded such that its ends end up opposite one another, after which these ends are connected to one another, preferably by means of a suitable glue.

In the embodiment according to figures 1 and 2, the body 1 consists of a number of foam layers with a different hardness, for example two, which are connected to one another.

Thus, the piece or block of which the body 1 is made also consists of two or several layers. When this piece or block is folded so as to form the body, with the hardest layer on the outside, differences in tension are created between the layers, so that the outer diameter becomes smaller in the middle than on the far ends, where the tension is translated into a conical shape of the surfaces on the far ends.

In the embodiment according to figure 3, the cavities 3 have a larger section on the far ends of the body 1 than in the middle.

Consequently, in the piece or block of which the body 1 was formed, larger cuts are provided near the edges which will form the far ends of the body, and, during the formation, the tension will be larger in the middle than on the far ends, which results in the narrowing/widening outside and in conical surfaces on the far ends.

The narrowing/widening form of the body 1 can also be obtained by making the piece or block particularly thick in relation to the length, for example by providing it with a thickness which is equal to one quarter or more of the length, so that during the folding into a cylindrical body 1, large tensions are created on the outer surface, and consequently the outside is narrowing/widening and the surfaces on the far ends are conical.

The body 1, formed on the basis of a piece or block 4 as represented in figure 4 provided with cuts, also has the smallest section in the middle. The longitudinal sides of this piece, which rest on the far ends of the body, are straight and parallel to one another. The cross sides 5, which are fixed to one another, are bent in a hollow manner, however.

As a result of the created tensions, also the surfaces on the far ends will be conically deformed.

However, better springy elements consist of the embodiments according to figures 5 and 6, in which the narrowing/widening outside and the conical surfaces on the far end of the body 1 are not obtained as a result of internal tensions, but by external means, namely a ring 6 or a plate 7.

The body 1 may then be formed on the basis of a rectangular piece or block which consists of one layer or several layers of foam, which is provided with equal cuts, which is folded so as to form a cylindrical body 1 and whose ends are fixed to one another.

In the embodiment according to figure 5, the external means consist of a sleeve or ring 6 which is provided in the middle around the body 1, which is practically cylindrical in rest position. Naturally, the inner diameter of the ring 6 is smaller than the diameter of the body 1 in rest position and thus smaller than and preferably equal

to 85% or less of the diameter of the body 1 on the far ends.

For a body 1 with a height of about 10 cm and a diameter on the far ends of about 11 cm, the ring 6 has a height of for example 2 cm and a thickness of 0.5 cm.

According to a variant, the ring 6 may be elastic and it can be for example an elastic band.

In the embodiment according to figure 6, the ring 6 is replaced by a plate 7 which is provided with a round opening 8 whose diameter is equal to the inner diameter of the ring and through which the body 1 extends.

This ring 6 or the plate 7 constrict the body 1 in the middle, so that a bi-conical body 1 with conical end surfaces is obtained on the outside.

The ring 6 or the plate 7 may be of foam, preferably of the same foam as the body 1, or of another material which is either or not springy.

The plate 7 can be common to two or several springy elements and thus ensure the connection between two or several foam bodies 1 which extend through several openings 8.

Such a plate 7, in particular a plate made of foam, with bodies 1 in the openings 8 is particularly suitable as the core of a springy support such as a pillow or such, although such a core may also consist of bodies 1 which are anchored in relation to one another in other ways.

Figure 7 represents such a pillow which consists of a core 9 and a casing 10.

The core 9 is formed of a foam plate 7 which is provided with openings 8 through which bodies 1 extend which are constricted by the plate 7 in their middles.

In order to comply with differences in height and/or roundings of the casing, the outer bodies 1 are hereby less high than the other ones.

As the bodies 1 are firmly anchored in their middles by the plate 7, there is less danger for these bodies to deflect when loaded, and consequently the bodies may be higher than without the plate 7. Thanks to the bi-conical shape of the bodies 1, a double springy action is obtained, both on the top side and on the bottom side of the plate 7.

Very good springy elements can also be formed according to the embodiment of figure 8, in which the narrowing/widening outside and the conical surfaces at the ends of the body 1 are not formed by external, but by internal means, namely by two cores 11 made of preferably softer foam than the body 1.

The piece or block from which the body 1 was formed and in which cuts were consequently made is made of hard foam in the embodiment represented, preferably polyurethane foam.

When the piece or block is folded into a cylinder and its ends are connected to one another, the cores 11 are provided in this cylinder along both ends.

Before they are provided inside the body 1, these cores 11 are cylindrical with a diameter which is bigger than the diameter of the above-mentioned cylinder. In order to provide the cores 11 inside the body 1, the latter can be stretched somewhat open. After the application, the cores 11 will be slightly transformed, but especially the body 1 will have taken on a pronounced bi-conical shape, so that the springy element is very soft, whereas it still retains its form very well, especially thanks to the high specific gravity of the foam of the body 1.

According to a variant, one core instead of two can be provided inside the body 1, whereby this core in this case consists of two cylindrical ends which coincide with the above-mentioned cores 11 which are connected to one another by means of a narrower connecting piece.

The invention is by no means limited to the embodiments described above and represented in the accompanying drawings; on the contrary, such a springy element and such a springy support can be made in all sorts of variants while still remaining within the scope of the invention.

Claims

1. Elastic, springy element containing a cylindrical foam body (1) provided with inward directed cavities (3) in its wall, characterized in that the outside of the body (1) is narrowing/widening from one end to the other.

2. Elastic, springy element according to claim 1, characterized in that the body (1) is round and in that, in the middle, the diameter thereof amounts to 85% or less of the diameter on the far ends.

3. Elastic, springy element according to claim 1 or 2, characterized in that the surfaces on the far ends of the body (1) are conical with their smallest section directed outward.

4. Elastic, springy element according to any of the preceding claims, characterized in that the body (1) is composed of layers with a different hardness.

5. Elastic, springy element according to any of claims 1 to 3, characterized in that the cavities (3) in the wall of the body (1) are larger near their far ends than in the middle.

6. Elastic, springy element according to any of claims 1 to 3, characterized in that the body (1) has a wall thickness which is particularly large in relation to the perimeter.

7. Elastic, springy element according to any of claims 1 to 3, characterized in that the body (1) consists of a flat piece of foam which is bent and of which two far ends situated opposite one another are fixed to one another, whereby these far ends are bent in a hollow manner.

8. Elastic, springy element according to any of claims 1 to 3, characterized in that the body (1) is narrowing/widening on the outside due to external means.

9. Elastic, springy element according to claim 8, characterized in that the external means contain a sleeve or ring (6) which surrounds the middle of the body (1) and constricts it.

10. Elastic, springy element according to claim 8, characterized in that the external means contain a plate (7) which is provided with an opening (8) through which the body (1) extends with its middlemost part in the opening (8).

11. Elastic, springy element according to any of claims 9 or 10, characterized in that the external means are made of foam.

12. Elastic, springy element according to any of claims 1 to 3, characterized in that the body (1) is narrowing/widening on the outside thanks to internal means.

13. Elastic, springy element according to claim 12, characterized in that the internal means are formed of at least one core (11) which contains at least a part which is bigger than the opening at one end of the body (1) before it is provided inside the body (1).

14. Elastic, springy element according to claim 12 or 13, characterized in that the core (11) is made of a softer foam than the body (1).

15. Elastic, springy element according to claim 13 or 14, characterized in that the internal means contain two cores (11) which are preferably cylindrical before the insertion in the body (1).

16. Springy support, characterized in that it contains at least two elastic, springy elements according to any of claims 1 to 10 which are anchored in relation to one another.

17. Springy support according to claim 16, characterized in that it contains a springy core (9) which consists of a plate (7) which is provided with openings (8) through which foam bodies (1) extend which are constricted by the plate (7) in the openings (8) and thus have a narrowing/widening outside, which plate (7) also connects the bodies (1) to one another.

18. Springy support according to claim 17, characterized in that it forms a pillow and in that the core (9) is surrounded by a casing (10).

19. Springy support according to claim 17 or 18, characterized in that the plate (7) is made of foam.

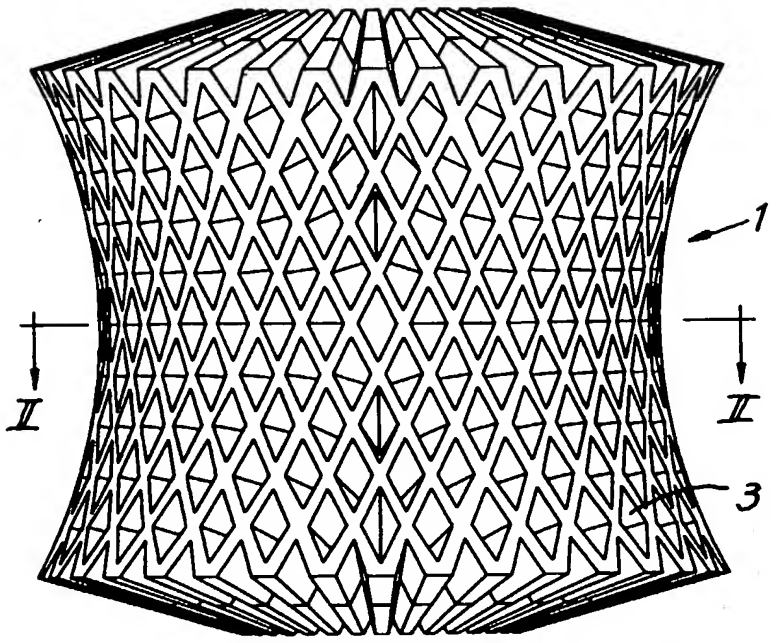

Fig. 1

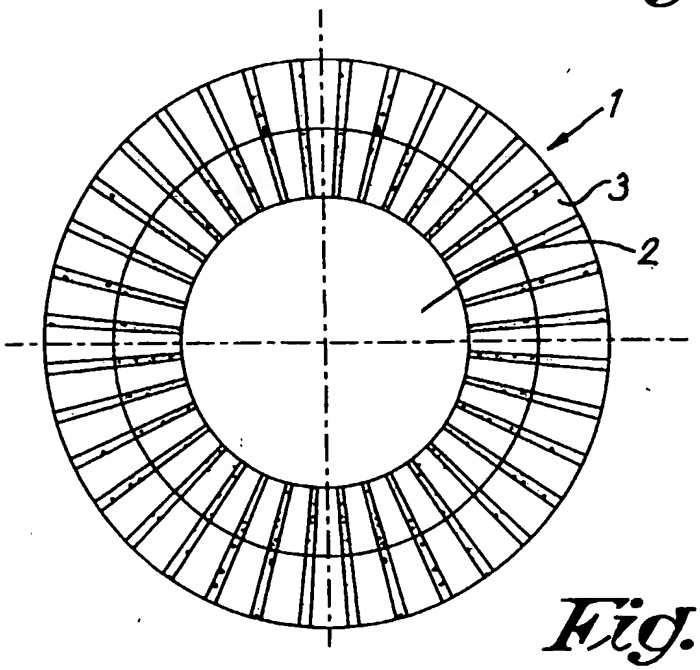

Fig. 2

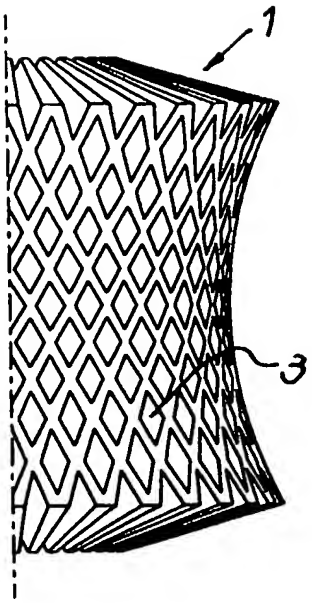

Fig.3

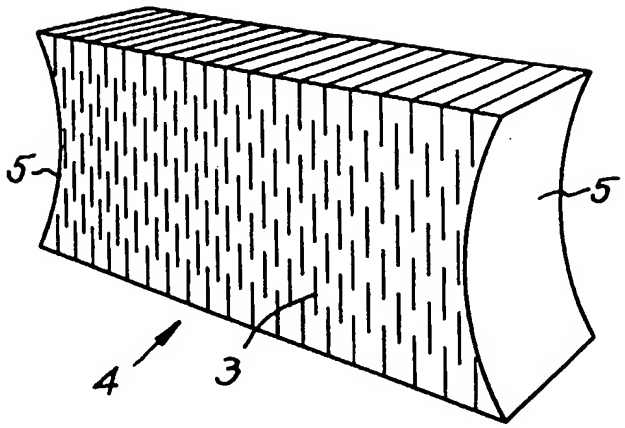

Fig.4

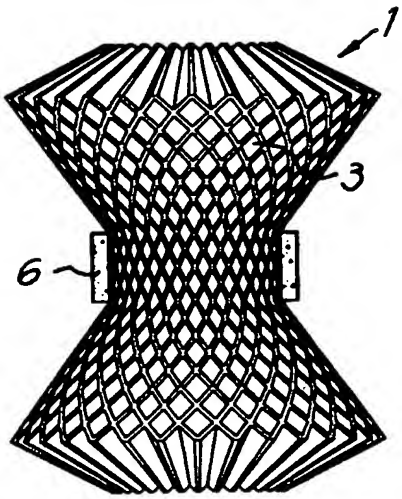

Fig.5

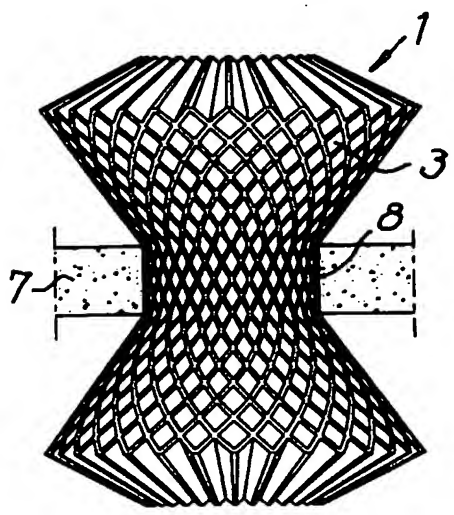

Fig.6

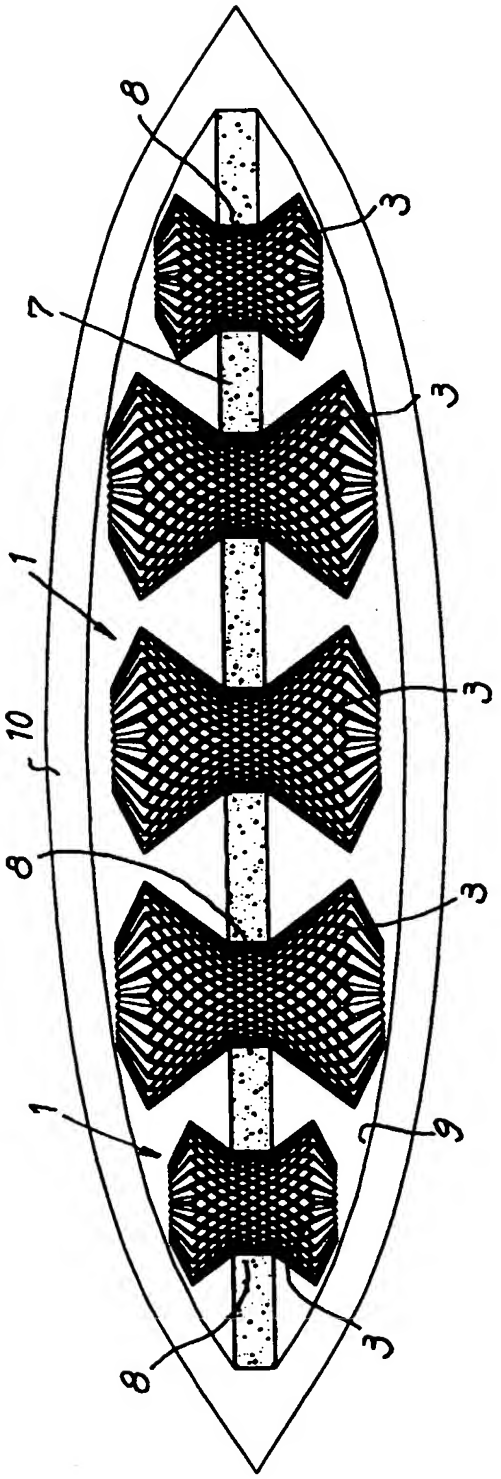

Fig.7

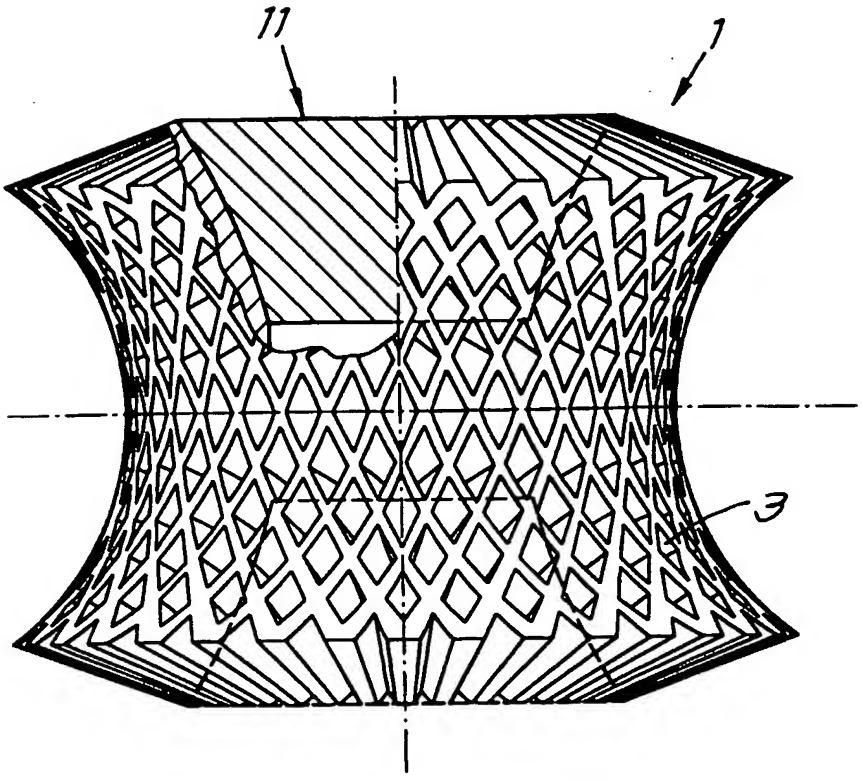

Fig.8

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EUROPEAN SEARCH REPORT

Application Number
EP 97 20 0607

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	EP 0 001 469 A (POPPE) * page 5, line 12 - page 7, line 13; figures 1-3,5 * ---	1,16	A47C27/14
A	WO 95 22922 A (HOET) * page 4, line 17 - page 6, line 32; figures 1-3 * -----	1,16	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

A47C
F16F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	9 June 1997	Mysliwetz, W

CATEGORY OF CITED DOCUMENTS

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